REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the foregoing amendments and the following remarks.

Claim Status

Claims 1 - 6 were presented in the originally filed application, a preliminary amendment amended claims 5 and 6 and added new claims 7-9. Accordingly, claims 1 - 9 are pending in the application. Claims 4, 7 and 8 are cancelled. Claims 1-3, 5, 6 and 9 are amended, new claims 10 and 11 are added.

§102 Rejection

Claim 1 stands objected to under 35 USC § 102(b) as being anticipated by Johnson. Applicants have amended claim 1 to set forth features found in paragraphs 0024, 0025, 0026 and 0027 of the publication US 2006/0124349 A (the instant application). If one reviews Johnson this reference discloses 10 mil (254 m) silicon, however, Johnson **does not disclose electrically conductive diamond.** The diamond coated silicon disclosed in example 22 of Johnson clearly difference from the claim 1 of the instant invention. Example 22 discloses (1) 10 mil thick silicon substrate and (2) coated with polycrystalline diamond. The

condition for deposition of diamond is cited the same as example 1 and condition are following:

Hydrogen flow rate: 186.3 sccm

Methane flow rate: 2.5 sccm

Oxygen flow rate: 0.85 sccm

There is no evidence that a dopant gas is introduced during the diamond growing step in Example 1. Pure porycrystalline diamonds are electrical insulator and diamond becomes electrical conductor only with doping (see paragraph [0003] of the instant application). For growing a conductive diamond layer, some dopant gas such as boron source is required during the growing step. The polycrystalline diamond films of Example 22 are not electrically conductive diamonds.

Claim 1 as amended, is clearly different from this reference. Applicants respectfully request that the objection be removed and the claim allowed.

§103 Rejection

Claims 1-9 stand objected to under 35 USC § 103(a) as being obvious from Kobashi in view of Dreifus and Burke. Applicants traverse.

The Examiner has cited four prior art references in this action the references are listed as follows with what they teach:

Johnson consists of; insulted diamond + monocrystal silicon substrate.

Kobashi consists of; aluminum electrode + insulated diamond layer + (boron doped) diamond layer + low resistance silicon substrate.

Burke consists of; insulated diamond layer + silicon substrate + aluminum body.

Dreifus consists of; aluminum electrode + insulated diamond layer + (boron doped) diamond layer + p-type silicon substrate.

The instant invention differs from these prior art references by disclosing 1) an electrically conductive diamond + silicon substrate, and 2) an electrically conductive diamond + silicon substrate + electrically conductive support substrate.

With regards to amended independent claim 1. Burke discloses a diamond-coated silicon in which (a) the diamond layer is first deposited in a usual thickness silicon, (b) then silicon are

thinned by HF chemical etching so as the final thickness of bonded silicon to the diamond layer become between 1 to 500 m (Column 2, line 29-52).

There is no evidence in this reference that during the diamond deposition process a dopant gas was introduced to make the diamond electrically conductive. Applicants reinforce that none of the prior art reference discloses a silicon substrate with thickness less than 500 μm coated with conductive diamonds.

Applicants therefore respectfully request that the objection to claim 1 be removed and the claim allowed.

Applicants have amended independent claim 2 to set forth features found in paragraphs 0024, 0025, 0026 and 0027 of the publication US 2006/0124349 A (the instant application).

Examiner said in page 4 of office action "therefore, one having ordinary skill in the art would have utilized this teaching of using a grown diamond layer on silicon in the prior arts of Kobashi et al or Dreifus et al to be used as a bonding agent in the making of an electrode that is used in electronic devices, since process of Burke set forth that improved bonds occurs between the diamond and silicon as well as between the aluminum

substrate and the silicon, which are the same material as used in the Kobashi et al or Dreifus et al devices."

On one hand, the term "electrode" in electronic field or electronic devices is used with the meaning of electrical terminal, electrical connector or as part of electrical junctions, the term electrode in electronic field is used to point out a pole for electrical conduction, the aluminum electrode 4 and ohmic copper electrode 5 in Example 1 of Kobashi et al is used exactly with this meaning. The aluminum or ohmic copper itself and alone is an "electrode". The electrode here does not include the silicon substrate as well as the diamond layers.

On the other hand, the term electrode, in this application as well as at the electrochemistry field in general that includes electrolytic reaction, electrode reaction, sensor and the like, refers to the whole feature that includes the substrate, active surface (diamond) and the supporting material. The whole feature constitutes the electrode that can work as anode(+) or cathode(-) in the electrolytic reaction. Diamond electrodes clean wastewater, producing OH radical in place of oxygen evolutions when used as anode (see paragraph 0004 of the instant application).

The term "electrode", in both cases above, is correctly used but they are used to indicate different feature that have different functionalities. Applicants are in agreement that the difference in functionalities is not the question, but some explanation of difference in functionalities, follow in view to explain better the difference in features. From now on, in view of avoiding confusion the term "electrical pole" will be used when referring to "electrode" as used electronic field and electrode will be used when referring to "electrode" as used in electrochemical field or this application. The main difference in the functionalities is that in electrode a chemical reaction is evolved and not in an electrical pole when an electrical current is passed.

The feature disclosed in Kobashi and Dreifus includes: (a) an electrical pole (Ag paste or Copper) 1, (b) a p-type silicon 2 above the pole 1, (c) a B(Boron) "doped diamond layer" 3 (a conductive diamond layer) above the p-type silicon 2, (d) an undoped (insulating) diamond layer 4 above the B-doped diamond layer, (e) an Aluminum electrical pole 5 (see Fig.2 of Dreifus or fig. 1 of Kobashi). This whole structure composes a diode and not an electrode. The main function of a diode is to rectify an electrical current; that means to allow an electrical current flowing only in one direction and avoiding the reverse current when an electrical potential is applied between the pole 1 and pole 5. **This structure can not be used as an electrode.** The presence of insulating diamond layer 4 makes a clear difference

when compared to the instant application. The presence of insulating diamond layer 4 will make it difficult for the electrical current to pass through this structure when used as electrode. Added to the insulating diamond layer 4, there is not any disclosure that the p-type silicon 2 has thickness less than 500 μm. When the thickness of the silicon exceeds 500 μm the electrical resistance will increase and become a disadvantage for use as electrode (paragraph [0025] of the instant application).

The technical field of Burke relates to a composition of matter and more particularly it relates to a substrate of aluminum, e.g., metal or aluminum alloy on the surface of which is bonded a film of diamond (see Col. 1 line 5-10). As explained above there is no evidence also in this reference that during the diamond deposition process a dopant was introduced to make the diamond electrically conductive.

The technical field of Kobashi is a diamond Schottky diode to be used for a rectifying device (see Col. 1, line 9-10).

The technical field of Dreifus is the field of semiconducting diamond technology and particularly to an improved arrangement for the fabrication of electronic devices such as rectifying diodes and transistors (see Col. 1, line 9-11).

On the other hand the instant application relate to silicon coated with electrically conductive diamond and use of such silicon as an electrode. An electrode according to the instant invention can be applied to electrolytic reaction.

Thus, it is not obvious for skilled artisan to combine Burke, whose technical field is aluminum alloy, with Kobashi, whose technical field is diode, or with Dreifus, whose technical field is diodes and transistors, to achieve the instant invention.

With respect to claims 1 and 2 the Examiner admits that neither the Kobashi nor Dreifus disclose silicon which is 500 microns or less. Burke discloses depositing an insulating diamond substrate on a silicon substrate which is subsequently thinned to a film in the range of 1-500 microns. Both claims 1 and 2 have been amended to add the feature taught in paragraph 0024 that the substrate is manufacture to a thickness of 500 microns or less which clearly removes the reference to Burke. Applicants traverse on the obviousness argument, Burke teaches using a thick silicon substrate which is subsequently reduced by etching. One of ordinary skill would assume that Kobashi and Dreifus would also use thick silicon as taught by Burke as all the references are to diamond coated silicon. If one wanted a thinner silicon layer then they would have to etch as taught by Burke.

Applicants point out that in the instant application claims 1 and 2 are independent. If claims 1 and 2 are allowable, then the dependent claims 3, 5, 6, 9 and new claims 10 and 11 should be equally allowable therewith.

With respect to Applicants inventions it should be clear that the prior art teaches structures like Kobashi, where the chips are 5 mm x 5 mm, which is quite different from the instant invention, which teaches, in paragraph 0027, that an example of the diamond coated silicon is 100mm x 1 meter and none of the references shows or suggests that an electrode similar to the electrode shown in Figure 4 is possible. In the Instant Application (paragraph 0009) Applicants speak of the difficultly in producing a diamond film on a large substrate.

As Applicants have the same number of claims which they originally paid for, no new fee is believed to be due. However, if the office determines that a credit is due, or an additional fee is necessary, then they are authorized to charge deposit account 08-2447.

The Examiner had objected to dependent claims 6, 8 and 9 as being of improper form, claims 6 and 9 are amended to overcome this objection, claim 8 is cancelled. Applicants respectfully request allowance of claims 6 and 9.

Related Case

The Examiner is advised that a related case by the inventors of the Instant Application is co-pending as application number 10/540,640. This case differs from the instant application in that it is draw to a method for producing diamond film-forming silicon.

IDS Filed on February 13, 2008 and March 10, 2008

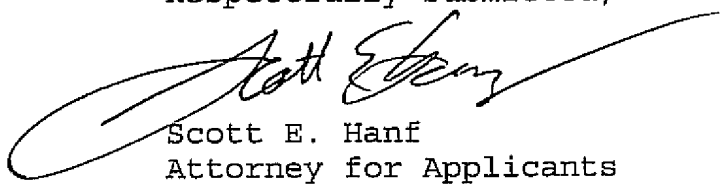
Applicants note that in the corresponding prosecution of this case in Japan, Applicants became aware of a new reference which has been supplied to the office. Acknowledgement of receipt of this reference is respectfully requested.

Then in the corresponding German action new references were received from the German Patent Office, acknowledgement of receipt of these references, are respectfully requested.

Conclusion

In view of the foregoing, Applicants respectfully requests an early Notice of Allowance in this application.

Respectfully submitted,



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